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New records of Orchidaceae Juss. for the state from Hidalgo, Mexico

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Abstract

Two new orchid records are reported for Hidalgo, *Notylia barkeri* Lindl. and *Trichocentrum cosymbephorum* (C. Morren) R. Jiménez & Carnevali. The genus *Notylia* is reported for the first time, and the list of orchid flora is updated to include 110 taxa. Unexpectedly, the species were recorded in abandoned orange plantations rather than natural vegetation, likely because of the high anthropogenic pressure exerted on their natural populations. These new records highlight the importance of continuing to survey regions such as Hidalgo with scarce orchid records, including both natural and modified vegetation.

Keywords

Abandoned orange crops, Hidalgo Huasteca, orchid flora, semi-evergreen tropical forest.

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Introduction

The family Orchidaceae Juss. has a worldwide distribution and is characterized by for its highly diverse morphology and species richness. The family is represented by approximately 27,801 species (The Plant List 2018; Givnish et al. 2016). In Mexico, 168 genera and around 1,250 species have been recorded, of which 444 species are endemic (Soto-Arenas 1996; Hágsater et al. 2005; Soto-Arenas et al. 2007). In the state of Hidalgo, 108 orchid taxa had been recorded, which represent around 8% of the orchid flora at the national level (Ponce-Vargas et al. 2006; Ceja-Romero et al. 2010; Bertolini et al. 2012, 2016; Molina-Mendoza et al. 2012).

Semi-evergreen tropical forest in Mexico is found along the coast of the Gulf of Mexico (Challenger 1988). In particular, the Huasteca region, which extends across the states of Hidalgo, San Luis Potosí, and Veracruz, has the northernmost extent of semi-evergreen tropical forest on the American continent (Luna 1997). In Hidalgo, semi-evergreen tropical forest has been severely fragmented and transformed to crops. Seven species of orchid have been reported in semi-evergreen tropical forest in Hidalgo (Ceja-Romero et al. 2010; Bertolini et al. 2012). In the municipality of San Felipe Orizatlán, in the Huasteca of Hidalgo, there are several important fragments of semi-evergreen tropical forest mixed

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with abandoned orange plantations, yet this municipality has been little explored for orchids. Only four species of orchid have been reported until now: *Bletia coccinea* Lex., *Vanilla planifolia* Jacks. ex Andrews, *Prosthechea radiata* (Lindl.) W.E. Higgins, and *Oncidium sphacelatum* Lindl. We carried out botanical surveys in the municipality of San Felipe Orizatlán in a semi-evergreen tropical forest and abandoned orange plantations and expand the knowledge of the orchid flora in the state of Hidalgo as a result of these surveys.

Methods

In March 2017, three botanical surveys were carried out in 4 km each of semi-evergreen tropical forest fragments and abandoned orange plantations in Ahuatitla, municipality of San Felipe Orizatlán (21°09' N, 098°39' W), in the Huasteca of Hidalgo (Fig. 1). Each of these surveys had a duration of approximately 4.5 hours. Two local guides and a botanical expert (Ricardo Alejandro Garza Paredes) aided us in determining our plots. In April the three established plots of 1 ha were studied by two researchers, about two hours each, to detect the presence of flowers in *Notylia barkeri* Lindl. and *Trichocentrum cosymbephorum* (C. Morren) R. Jiménez & Carnevali. As no flowers were detected in *T. cosymbephorum*, a second visit was conducted during of October and a third visit of November.

The literature recording orchids in the state of Hidalgo was reviewed (Villavicencio-Nieto et al. 1998; Ponce-Vargas et al. 2006; Ceja-Romero et al. 2010; Bertolini et al. 2012, 2016; Molina-Mendoza et al. 2012). The collected specimens were identified by specialists and were herborized following the techniques of Lot and Chiang (1986). The species names were verified according to The Plant List (2018). The identity and geographic distribution of the specimens were additionally corroborated with specimens from the National Herbarium of the National Autonomous University of Mexico (MEXU), the Metropolitan Autonomous University (UAMIZ), and the herbarium of the Center for Biological Studies of the Institute of Basic Sciences and Engineering of the Autonomous University of Hidalgo (HGOM), as well as with specimens in online databases such as Tropicos, The Plant List, and the Global Biodiversity Information Facility (GBIF). Finally, the collected specimens were deposited in the herbarium of the Center for Biodiversity and Conservation Research of the Autonomous University of the State of Mexico (HUMO).

Results

Two new records of orchids are added to the flora of Hidalgo (Ponce-Vargas et al. 2006; Ceja-Romero et al. 2010; Bertolini et al. 2012, 2016, Molina-Mendoza et al. 2012).

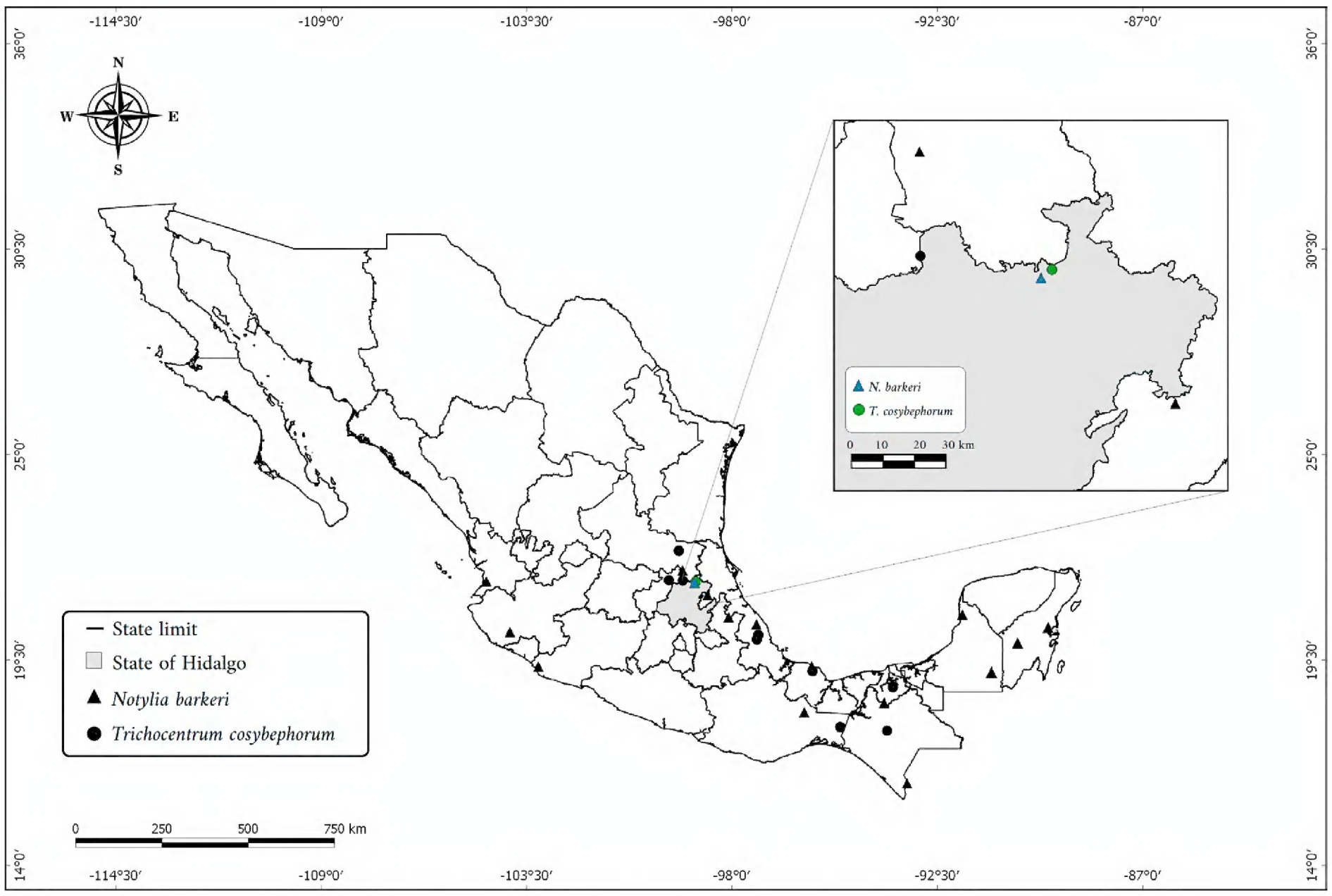

Figure 1. *Notylia barkeri* Lindl. geographic distribution map with data from herbaria and GBIF records (see Table 1), and *Trichocentrum cosymbephorum* (C. Morren) R. Jiménez & Carnevali in Mexico. The new records contributed by this study are highlighted with color.

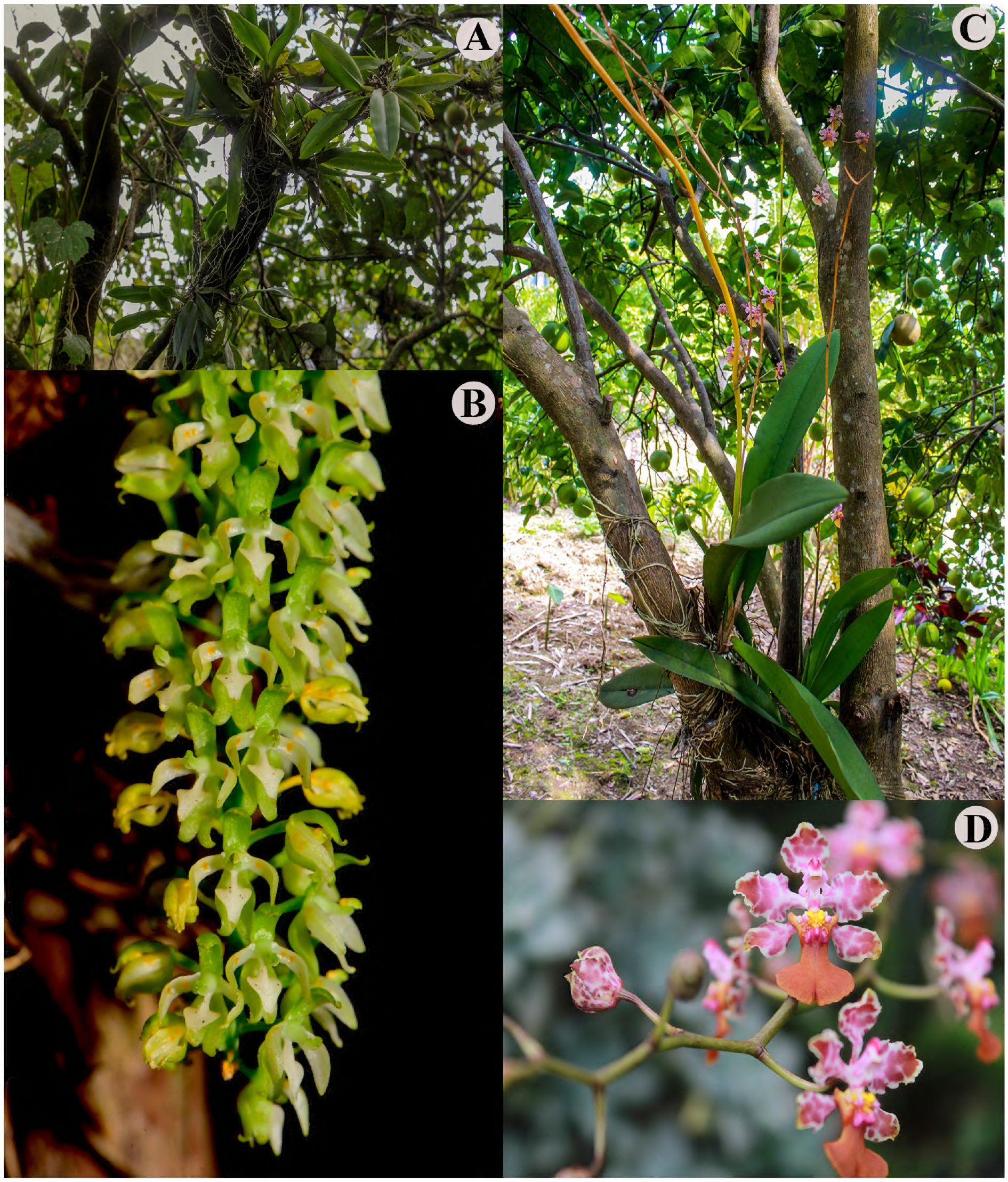

Figure 2. A, B. *Notylia barkeri* Lindl. **C, D.** *Trichocentrum cosymbephorum* (C. Morren) R. Jiménez & Carnevali. **A, C**. Habit. **B, D.** Flowers.

***Notylia barkeri* Lindl.**

New record. Mexico: Hidalgo: municipality of San Felipe Orizatlán, Ahuatitla (21°08′33.60″ N, 098°40′27.80″ W, 364 m elev.), in abandoned orange (*Citrus* spp.) plantation "Atotomoc", coll. by A. Hernández-Orta, 11 April 2017, (HUMO) (Fig. 2A, B).

Identification. *Notylia barkeri* is a small epiphyte, often with long, pendent roots; pseudobulbs oblong, to 2.5 cm long and 1 cm wide, enveloped at base by several imbricating bracts. Leaves solitary from apex of pseudobulb, ligulate, 8–18 cm long, 1.3–4 cm wide, conduplicate at base. Racemes 1 or 2, arching, 8–30 cm long (usually <15 cm long) from base of pseudobulb, many flowered; flowers green or greenish-white and resupinate; pedicels filiform, 2–6 (10) mm long, subtended by minute bracts; sepals subequal, linear-lanceolate, lip clawed and continuous with base of column, 3–5 mm long, l–2 mm wide. Pseudobulbs completely covered by sheaths and lateral sepals free or connate (½ of their

length) with recurved apices; it differs from *N. orbicularis* which presents pseudobulbs covered by sheaths only at the base and entirely connate lateral sepals.

Comments. *Notylia barkeri* is widely distributed in Mexico from Jalisco and Tamaulipas to southern Mexico, including Chiapas, Tabasco, and Quintana Roo (Tropicos 2017). In our survey, large populations (between five and 10 individuals per tree) were mainly observed in abandoned orange plantations. This species has not previously been recorded in semi-evergreen tropical forest. It is a twig epiphyte (Chase 1987) which grows in areas exposed to sunlight and tends to naturally occur at gaps or edges. The flowering period was from March to April in the study area.

***Trichocentrum cosymbephorum* (C. Morren) R. Jiménez & Carnevali.**

New record. Mexico: Hidalgo: municipality of San Felipe Orizatlán, Ahuatitla (21°10'03.4" N, 098°39'59.7" W, 242 m elev.), in the abandoned orange (*Citrus* spp.) plantation "Camelia", coll. by A. Hernández-Orta, 12 November 2017, (Fig. 2C, D).

Identification. *Trichocentrum cosymbephorum* is an epiphyte, with leaves that generally exceed 12 cm long, oblong-elliptical to elliptical, acute; thin roots, 2 mm thick. Pseudobulbs very small, compressed and uniform, smooth, dark green. Inflorescences usually longer than leaves, more or less simultaneous, and with resupinate flowers (1–25), rarely successive flowers; lip without spur, with callous teeth of six proximal parts; distal teeth of calluses in two parts; central keel of the callus one or two times smaller than the length of the distal teeth of the callus. Morphologically similar to *T. luridum*, but characterized by its pale brown to pink flowers (not reddish-brown) and leaves, which are up to twice as long.

Comments. *Trichocentrum cosymbephorum* is endemic to Mexico, where it has a wide distribution. It is found at middle elevations from the Sierra Madre Oriental of Tamaulipas to Chiapas. It is scarce in the study area, with one to two individuals per tree. This species is an epiphyte, living mostly on abandoned orange trees or in backyard gardens. Some individuals grow in sunny sites along the edges of semi-evergreen tropical forest. Several individuals were rarely seen on the host trees *Inga vera* (Mimosaceae, Willd.) and *Cedrela odorata* (Meliaceae, L.). The flowering period was from October to November in the study area.

Espejo-Serna and López-Ferrari (1998) had previously reported the type (Mexico) of *T. cosymbephorum* in the state of Hidalgo under the name of *Oncidium luridum* Lindl. var. *henchmannii* Knowles & Westc. However, the type was apparently lost or destroyed, so Christenson (1996) designated the lectotype, which enables us to confirm the presence of this species in Hidalgo.

Discussion

Notylia barkeri and *Trichocentrum cosymbephorum* are common species and widely distributed in Mexico, and therefore are not threatened according to SEMARNAT (2010). However, the new records are the first for

Table 1. Herbarium and GBIF records of *Notylia barkeri* Lindl. and *Trichocentrum cosymbephorum* (C. Morren) R. Jiménez & Carnevali and the distances between each record and the new records (see Results).

Species	Herbarium	Catalogue no.	State	Latitude	Longitude	Altitude (m)	Distance (km)
N. barkeri	MEXU	1162339	Campeche	18°24'33.0"N	089°29'34.0"W	295	1,006
N. barkeri	UCAM	172	Campeche	20°10'21.0"N	090°23'40.0"W	9	868
N. barkeri	ECO-TA-H	3732	Chiapas	15°01'10''N	092°06'20''W	850	973
N. barkeri	ZEA	8835	Jalisco	19°38'13.0"N	104°23'42.0"W	225	623
N. barkeri	MO	16126	Michoacán	18°35'00''N	103°31'00''W	178	582
N. barkeri	CNS-UT	111443	Nayarit	21°11'10.3"N	105°07'26.6"W	30	670
N. barkeri	UAMIZ	61316	Oaxaca	17°11'13''N	095°17'08''W	155	568
N. barkeri	UAMIZ	31463	Puebla	20°05'36'' N	097°37'30.5''W	505	160
N. barkeri	MEXU	1181058	Quinta Roo	19°17'51.0"N	088°41'05.0"W	55	1,056
N. barkeri	CICY	51784	Quinta Roo	19°46'13.9"N	087°44'23.3"W	9	1,150
N. barkeri	CNS-UT	111441	San Luis Potosí	21°31'15.0"N	099°03'10.0"W	571	55
N. barkeri	UAMIZ	9500	Tabasco	17°28'22"N	092°48'50"W	50	739
N. barkeri	UAMIZ	44348	Veracruz	19°52'25.0"N	096°45'55.0"W	329	255
N. barkeri	XAL	65354	Veracruz	20°46'00.0"N	098°16'30.0"W	225	60
N. barkeri	MEXU.	V007805	Veracruz	18°35'11''N	095°03'09''W	10	474
T. cosymbephorum	CHIP	1824596	Chiapas	6°37'30.0"N	092°43'30.0"W	797	802
T. cosymbephorum	CHAPA	79365	Oaxaca	16°44'30.0"N	094°10'30.0"W	1426	678
T. cosymbephorum	IEB	931942	Querétaro	21°13'18.0"N	099°28'24.0"W	740	80
T. cosymbephorum	AMO	95357	Querétaro	21°12'30.0"N	099°02'30.0"W	210	38
T. cosymbephorum	AMES	2072000	San Luis Potosí	22°06'60.0"N	099°09'60.0"W	700	120
T. cosymbephorum	MO	600737	San Luis Potosí	22°06'60.0"N	099°09'60.0"W	225	118
T. cosymbephorum	UJAT	163666	Tabasco	17°57'10.0"N	092°32'53.0"W	1	736
T. cosymbephorum	XAL	163012	Veracruz	19°32'53.0"N	096°42'33.0"W	502	272
T. cosymbephorum	XAL	19726	Veracruz	18°26'48.0"N	095°01'34.0"W	520	486

the state of Hidalgo. This state has a scarcity of orchid records despite the presence of semi-evergreen tropical forest remnants across 4.8% of its territory (Anonymous 1992). Semi-evergreen tropical forest is now only found in patches because it has largely been substituted by agricultural crops (Bertolini et al. 2012), including coffee and orange plantations. Notably, we expected to find orchid records in semi-evergreen tropical forest remnants but were taken to abandoned orange plantations by our guides. Orange plantations could be providing a new niche for these species.

The distances between the new records of *N. barkeri* and *T. cosymbephorum* and previous records are shown in Table 1. Finally, the geographical coordinates and elevation of the orchid records obtained from Herbarium and GBIF are shown in Table 1. In general, *N. barkeri* and *T. cosymbephorum* are distributed in lowlands (average elevation = 241.25 m and 591.36 m, respectively) of the Atlantic slope (Table 1, Fig. 1).

Around 60% of the native vegetation of the state of Hidalgo has been transformed to crop fields, pastures, or human settlements (Martínez-Morales et al. 2007), so it is important to continue to explore this state's biodiversity in order understand it and promote its conservation. Additional exhaustive botanical surveys in the Huasteca region of Hidalgo and the remaining conserved forest fragments are needed to generate more accurate and up-to-date knowledge of the orchid flora of the state, where few historical orchid records exist. However, as shown by our new records, abandoned crop plantations should also be surveyed. Additional surveys will generate valuable information needed to conserve the few remnants of native tropical forest. Finally, with the addition of *N. barkeri* and *T. cosymbephorum* in Hidalgo, the number of orchid species in the state is updated to 110, which represents around 9% of the orchid species recorded for Mexico (Ponce-Vargas et al. 2006; Ceja-Romero et al. 2010; Bertolini et al. 2012; Molina-Mendoza et al. 2012; Bertolini et al. 2016).

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Authors' Contributions

CAHO made the collections and reviewed herbarium specimens; CAHO and JML made the identification; CAHO and KMAD designed the study and wrote the manuscript. All of the authors contributed to the discussion, review, and approval of the final manuscript.

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